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AUTHOR Humphrey, Danette
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ABSTRACT

Previous studies have indicated some support for the hypothesis that breast feeding has a positive effect on intelligence and attainment among young children. This study examined the effects of breast-feeding versus bottle-feeding on the intelligence quotients (IQs) of first graders. A total of 26 breast-fed and 26 bottle-fed first graders from an elementary school in Kentucky completed the Otis-Lennon School Ability Test to determine IQ. To qualify for the breast-fed group, the children had to have been exclusively breast-fed for at least 4 months. The study found that although the average IQ score of the breast-fed group was five points higher than the bottle-fed group, no significant correlation was found between feeding type and corresponding IQs. (Three appendixes contain copies of communication with the parents of the children in the study and a questionnaire used to determine whether children were breast-fed or bottle-fed. Contains 15 references.) (MDM)

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Relationship of Breast-fed and Bottle-fed First Grade Students and I.Q.

Danette Humphrey

819 Sanders Avenue

Paducah, Kentucky 42001

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Abstract

The purpose of this study was to investigate the effect that breast-feeding and bottle-feeding had on the I.Q.'s of first grade elementary students. Using a Pearson r the breast-fed students (n=26) and bottle-fed students (n=26) were compared and it was found that there was no significant correlation between the feeding type and I.Q. score ($r=.007$, $p>.05$). It was concluded that the feeding method used, bottle or breast, did not affect student's I.Q. in a significant way.

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Introduction

The issue of the beneficial effects of breast-feeding on early cognitive development is a current and controversial one (Temboury, Otero, Polanco & Arribas, 1994). One area of particular interest concerns the difference in intelligence test scores between those children breast-fed versus bottle-fed.

A number of studies have examined the relationship between early cognitive development and breast-feeding. Children breast-fed were found to have a one to two point higher score on some attainment tests even when several other influential social factors were taken into account (mother's age, pacifier use, number of older siblings, and father's occupation) (Taylor & Wadsworth, 1984; Gale & Martyn, 1996; Fergusson, Beautrais, & Silva, 1982). Hoefer and Hardy (1929) further concluded that infants having some maternal milk, on average, have a better chance to develop a high degree of intelligence than those fed artificial milk.

When children were breast-fed they seemed to be more active, have an enhanced learning ability, have higher I.Q. scores, and better language skills than their bottle-fed counterparts (Taylor & Wadsworth, 1984; Hoefer & Hardy, 1929). Of the children with superior intelligence (quotient 120 and above) the majority were found to be breast-fed (Hoefer & Hardy, 1929).

Statement of the Problem

The purpose of this study was to investigate the relationship of breast-fed and bottle-fed first grade elementary students and I.Q. scores.

Review of Related Literature

The benefits of breast milk on the health and well being of infants has been a topic of discussion for many years. Most agree breast milk is best because it contains antibodies which protect infants against common childhood illnesses and infections (Temboury, Otero, Polanco & Arribas, 1994; Cherry, 1991). Pabst and Spady (1990) found evidence that breast-feeding enhanced an active hormonal immune response to vaccinations leaving seven month infants with higher antibody levels.

Special proteins in maternal milk have also been shown to help prevent urinary tract infections and rotoviruses which cause severe diarrhea, the second leading killer in children under five years of age (Coppa, Gabriella, Giorgi, Catassi, & Montanari, 1990; Raloff, 1994; C.V., 1991). Discoveries concerning the benefits of breast milk for children born pre-term have also been made. Necrotising enterocolitus, the most common serious gastrointestinal disease seen in neonatal intensive care units with a reported mortality rate of 20-40% was reduced 6-10 times in children fed maternal milk even for a few weeks (Lucas & Cole, 1990).

Not only has breast milk been shown to help prevent illness, but the long-chain polyunsaturated fatty acids which are present and not duplicated in most formula-milks may have a vital role on brain development (Gale & Martyn, 1996; Lanting, Fidler, Huisman, Touwen, & Boersma, 1994). Sandra K. Larson (1991) found that breast-fed neonates had a more optimal physiological organization which led to more optimal development and significantly high scores on the Bayley Mental Development Index in the later stages of infancy.

Breast-feeding does not just effect the health and mental development of infants though. A long-term influence on neurodevelopment was shown by Lucas, Morley, Cole, Lister, and Lesson-Payne (1992). Children born pre-term and given maternal milk reported higher developmental scores at 18 months and an 8.3 point higher score on the abbreviated version Weschler Intelligence Scale for Children at 7-8 years of age. Hoefer and Hardy (1929) also found a significant positive difference concerning the intelligence and later mental development in children ages 7-13 who were breast-fed as infants.

Not all studies show a difference in the I.Q.'s of children fed differently though. Taylor & Wadsworth (1984) as well as Gale & Martyn (1996) both felt women who breast-fed were more likely to come from a high social class. A mother's personality and psychological state, the

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domestic environment, age of parents, number of siblings, and the child's educational experiences were also variables which were considered to influence child development. Taylor & Wadsworth and Gale & Martyn all felt that even though breast-fed babies scored slightly high scores on some I.Q. tests, the child's social environment may have more effect on later intelligence than nutritional qualities of milk.

Although all cannot agree on the exact extent maternal milk has on the actual I.Q. scores of children, a definite correlation appears to exist. Not only are breast-fed children less likely to have neurological problems and learning disorders which could be an important determinant in school failure or success, but were actually shown to have a greater chance at being exceptionally bright (Hoefer & Hardy, 1929; Taylor & Wadsworth, 1984; Lanting, Fidler, Huisman, Touwen, & Boersma, 1994).

Statement of the Hypothesis

Numerous studies have examined the relationship between breast-feeding and cognitive development. Due to the link shown between later mental developmental and maternal milk, more research is warranted on the effects of breast-feeding and I.Q. It is therefore hypothesized that first grade students who were breast-fed will have a significantly higher I.Q. score than those students who were bottle-fed.

Method

Subjects

The sample for this study consisted of 190 elementary students with an Otis-Lennon School Ability Test (OLSAT) I.Q. score from their first grade year. One of the six elementary schools in Western Kentucky was chosen for this study based on the existence of entire first grade with OLSAT I.Q. Scores for the past two years. The population of students was approximately 98% Caucasian, and 2% other, mainly African American. All students with an OLSAT I.Q. score who chose to participate in the study were placed into either a breast-fed or bottle-fed group based on information obtained from parents in a questionnaire sent home.

Instrument

The Otis-Lennon School Ability Test (OLSAT) Primary Level 1 was used as the measuring instrument. The test was designed to measure individual first grade student performance in abstract thinking and reasoning ability with the finals core reported as a Deviation Intelligence Quotient. Content Validity is good with Primary I and II test levels being presented orally by the examiner and thus requiring no reading by pupils. The reliability coefficients strongly indicate the

OLSAT is an internally consistent test with the range of K-R 20's for age ranging between .90 and .95. The data also appears fairly stable and consistent over a six month period with separate test-retest stability correlations ranging from .84 to .92. Reliability was achieved by over 1500 test items and experimental test forms being administered to nearly 55,000 students from 70 school systems closely resembling certain characteristic descriptive of public and private school students during the 1980's.

A questionnaire was developed by myself and used as the instrument to determine if subjects qualified for the study. The questionnaire was designed to measure which type of feeding, bottle, breast or combination, each subject received as an infant and the duration of each method. To qualify for the breast-fed group subjects had to be exclusively breast-fed for at least four months. Four months was chosen based upon the research of Hoefer & Hardy, 1929; and Fergusson, Beautrais, & Silva, 1982: who all found that children breast-fed at least four months showed a significantly higher I.Q. score than those who were breast-fed a shorter period of time or not at all. Students who were exclusively bottle-fed could qualify for that corresponding group, and all students fed a combination of methods, bottle and breast simultaneously, were thrown out.

The Pearson r formula was used to see if any correlation existed between the two variables; feeding type and I.Q.

Correlation Design

The design used in this study was the Correlation design (see Table 1). It was selected because this study was interested in determining if a relationship existed between two variables, bottle or breast-fed first grade students and their corresponding OLSAT I.Q. score. Potential threats to validity with this design was low percentage of parental questionnaire returns, validity of parental responses, and a low disproportionate number of subjects in either of the feeding groups. Although there was no way to determine the correctness of parental responses, neither of the other factors were a problem with 73% of questionnaires returned completed with 65 and 26 students qualifying for the bottle and breast-fed groups respectively. The 65 bottle-fed subjects were reduced to 26 using a table of random numbers.

Group	Assignment	N	Treatment
X	breast-fed	26	OLSAT I.Q. score
Y	bottle-fed	26	OLSAT I.Q. score

Table 1. Correlation Design

Procedure

During the spring semester of the 1996-97 school year one of six elementary schools in Western Kentucky was chosen to participate in this study based on the existence of entire grade levels with OLSAT I.Q. scores for the past two years. After receiving permission and support from the administration and teachers involved, a letter, endorsed by the principal (Appendice A), was sent home with 190 students involved explaining the purpose of the study and requesting parental permission to use OLSAT I.Q. score information. A short questionnaire (Appendice C) was also attached asking parents to identify the type and length of feeding, breast, bottle, or combination, which their child received as an infant. Parents were given one week to return the questionnaire completed. The following week a second letter and questionnaire were sent to all students who had not returned theirs.

Based on information obtained from the questionnaires, students were put int either a breast-fed (Group X) or bottle-fed (Group Y) group. A subject had to be either breast-fed exclusively for at least four months or bottle-fed exclusively to qualify. Subjects receiving a combination of feeding methods with the first four months of infancy were eliminated from the study. If the number of subjects in both groups were not equal, a table of random numbers were used to

eliminate students in the larger group until groups equality was achieved. Subjects in each group were then matched with their corresponding OLSAT I.Q. score and a Pearson r was run to see of a relationship existed between the two variables; feeding type and I.Q.

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Results

Following the selection of 52 students with an existing OLSAT I.Q. score and the placement of those subjects into either a breast or bottle-fed group, an examination of group means was completed in order to check group equivalence. Examination of the means and a t test for independent samples (a=.05) indicated essentially no difference between the groups (see Table 2). A t test was used because the groups were randomly formed.

Table 2
Means and t Test for the Breast-fed and Bottle-fed Groups

	Group		
Score	Breast-fed Group	Bottle-fed Group	t
I.Q. Scores			
M	109.69	105.15	0.027

Note: The df = 50 (2.010).

n = 26
p < .05

Table 3

Pearson r

Statistic	Value
N	26
EX (breast-fed)	2852
EY (bottle-fed)	2734
EX (breast-fed)	319522
EY (bottle-fed)	292306
Mean of 'X' score (breast-fed)	109.69
Mean of 'Y" score (bottle-fed)	105.15
EXY	300760
Pearson's r	.0086
df	24

Note: The Pearson r table does not show a df for n = 24 so n = 25 was used (.3809). $p < .05$

At the completion of the study I.Q. scores from the breast and bottle-fed groups were compared using the Pearson r formula to see if any relationship existed between them. As Table 3 indicates, a score of r = .0086 was achieved and was found to not be significant leading one to believe there is little correlation between the type of feeding method and corresponding I.Q. score. Therefore, the original hypothesis that "first grade elementary students who were breast-fed are more likely to have a higher I.Q. score than those students who were bottle-fed" was rejected.

Discussion

The results of this study do not support the original hypothesis; first grade elementary students

who were breast-fed are more likely to have a higher I.Q. score than those students who were bottle-fed. Although the average I.Q. score in the breast-fed group was 109.69, five points higher than that of the bottle-fed groups 105.15, when the Pearson r formula was used no significant correlation was found to exist between the feeding type and corresponding I.Q.'s.

Even though few would argue against the physical benefits of breast milk for infants, the link between breast-feeding and I.Q. has been in debate for years. While Gale & Martyn (1996), and Langing, Fidler, Huisman, Touwen, & Boersma (1994) believe the long-chain polyunsaturated fatty acids present in breast milk may have a vital role on brain development, several other feel a number of variables contribute, if not determine, the differences in I.Q. scores (Taylor & Wadsworth, 1984; Gale & Martyn, 1996).

While this study shows no significant correlation between feeding type and I.Q., further research is needed considering the marked difference in mean scores of both groups and the likelihood that other variables, number of siblings, parental education, socio-economic level,

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educational experiences of the child, do have an effect on children's I.Q. scores. Breast-feeding infants still appears to be a natural and positive practice for mothers to continue considering the emotional attachment achieved as well as numerous long-term health benefits for the child.

References

Cherry, S. (1991, September) Deciding whether to breast-feed. Educational Record, 175-176.

Coppa, G., Cabriella, O., Giorgi, P., Catassi, C., & Montanari, M. P. (1990, March) Preliminary study of breast-feeding and bacterial adhesion to uroepethelial cells. The Lancet. 335, 569-571.

Fergusson, D. M., Beautrais, A. L., Silva, P. A. (1982) Breast-feeding and cognitive development in the first seven years of life. Social Science Medicine, 16, 1705-1708.

Gale, C., & Martyn, C. (1996, April) Breast-feeding, dummy use, and adult intelligence. The Lancet, 347, 1072-1075.

Hoefer, C., Hardy, M. C., (1929, February) Later development of breast fed and artificially fed infants. Journal of the American Medical Association, 92, 615-619.

Larson, Sandra K.; and others (1991, April) Outcome differences between breast-fed and bottle-fed infants. Paper presented at the biennial meeting of the Society for Research in Child Development, Seattle, Washington. (ERIC Document Reproduction Service No. ED 332826)

Lucas, A., Morley, R., Cole, T.J., Lister, Gl, & Lesson-Payne, C. (1992, February). Breast milk and subsequent intelligence quotient in children

born preterm.

The Lancet, 339, 261-264.

Lanting, C. I., Fidler, V., Huisman, M., Touwen, B. C. L., & Boersma, E. R. (1994, November) Neurological differences between 9-year-old children fed breast-milk or formula-milk as babies.

The Lancet, 344, 1319-1322.

Lucas, A., Cole, T. J., (1990, December). Breast milk and neonatal necrotising enterocolitis.

The Lancet, 336, 1519-1523.

Otis, A., Lennon, R. (1977-82) Otis-Lennon School Ability Test.

The ninth mental measurement yearbook, 409, 1106-1112.

Pabst, H., & Spady, D. (1990, August). Effect of breast-feeding on antibody response to conjugate vaccine.

The Lancet, 336, 269-270.

Raloff, J. (1994). Breast milk: Can it slime away disease?

Science news, 142, 390.

Taylor, B., Wadsworth, J., (1984) Breast feeding and child development at five years.

Developmental Medicine & Child Neurology, 26, 73-80.

Temboury, M.C., Otero, A., Polanco, I., & Arribas, E. (1994).

Influence of breast-feeding on the infant's intellectual development.

Journal of Pediatric Gastroenterology and Nutrition, 18, 32-36.

V., C. (1991, August). Mother's milk.

World Health.

Appendice A

Dear Parents,

Much has been written about the benefits of breast-feeding infants. While breast milk contains protective antibodies, is easier to digest, and breast-feeding itself helps mother and baby attach, the emphasis of benefits has been placed on the first two years of life. I am a graduate student from Murray State University conducting a research project that takes this concept, the benefit of mother's milk, a step further. Although research has shown numerous factors are involved in the development of a child's intelligence, the purpose of this study is to look only at the relationship between the method of feeding infants, and I.Q. in first grade students.

Your child was chosen to participate in this research project because they have an existing Otis-Lennon School Ability Test from their first grade year. Participation is voluntary, but we request your cooperation. Your participation will increase the significance and reliability of this study.

The attached questionnaire, received and endorsed by Mr. Hooper, is the only information needed from parents/guardians to complete this study. Students will be given an identification number for data purposes and to assure confidentiality regarding test scores. Results from this study will be available at your school in May.

The attached questionnaire should be returned to your child's teacher within one week. Thank you for your participation.

Sincerely,

Danette Humphrey

Danette Humphrey
Murray State University
Graduate Student

Sincerely,

Scott K Hooper

Mr. Hooper
Hendron Lone Oak Elementary
Principal

Appendice B

Dear Parents,

Several days ago you received a letter and questionnaire concerning a study I am currently conducting, which looks at the relationship between the method of feeding infants, bottle or breast, and I.Q. in first grade students. Response has been very good, however, I would like to give everyone ample opportunity to participate in case your questionnaire was misplaced or never received. Your response is vital to increase the significance and reliability of this study.

The attached questionnaire, received and endorsed by Mr. Hooper, is the only information needed from parents/guardians to complete this study. Student test scores will remain confidential. Results from this study will be available at your school in May.

The attached questionnaire should be returned to your child's teacher by Thursday, March 27, 1997. If you have already responded, please disregard this reminder and thank you for your participation.

Sincerely,

Danette Humphrey

Danette Humphrey
Murray State University
Graduate Student

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Appendice C

The Relationship of Breast-fed and Bottle-fed First Grade Students and I.Q.

The completion of this questionnaire and parental/guardian signature will give your child permission to participate in this study. Your child's test scores will remain confidential. Thank you for your cooperation.

Please answer each question by writing the appropriate number of months in the space provided.

1. How many months was your child only breast-fed? _____
2. How many months was your child only formula-fed? _____
3. How many months did your child receive a combination of feeding methods, breast and formula? _____

Parental/Guardian Signature _____

Child's Name (please print) _____

Child's Birth Date _____